

Appl. No. : 10/078,283
Filed : February 14, 2002

AMENDMENTS TO THE CLAIMS

1. – 5. (Canceled)

6. (Currently Amended) A multilumen catheter for directing the flow of blood through a patient through a single cannulation site, said catheter comprising:

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

a first lumen extending between said first distal end and said proximal end adapted to fluidly communicate with the patient;

a second lumen extending between said second distal end and said proximal end adapted to fluidly communicate with the body independently of the first lumen; and

a redirecting tip positioned at the distal end of one of the lumens, the redirecting tip comprising at least one outlet in a side of the lumen and an internal flow redirecting surface extending from adjacent to a central longitudinal axis of the lumen to a distal portion of the outlet, the redirecting surface having an apex located between the longitudinal axis and the outlet, the redirecting surface being [[and]] configured to redirect substantially all of the blood flow exiting said lumen in a direction generally opposite of the direction of flow in the lumen;

~~wherein the second lumen is positioned coaxially with the first lumen and has a diameter greater than the first lumen.~~

7.-8. (Canceled)

9. (Previously Presented) A method of using the multilumen catheter of Claim 6 comprising the step of directing the catheter through a patient's vasculature, thereby permitting a user to draw blood through the second lumen and redirect said blood into the first lumen.

10. – 20. (Canceled)

Appl. No. : 10/078,283
Filed : February 14, 2002

21. **(Currently Amended)** The multilumen catheter of Claim 620, wherein the flow redirecting surface extends across the first lumen between a side of the lumen and a longitudinal axis of the first lumen.

22. **(Currently Amended)** The multilumen catheter of Claim 619, wherein the flow redirecting surface substantially prevents blood from flowing beyond the surface in the lumen in which the surface is positioned.

23. **(Currently Amended)** The multilumen catheter of any of Claim 619, wherein the lumen in which the flow redirecting surface is positioned has a closed distal end.

24. **(Currently Amended)** The [[A]] multilumen catheter of Claim 6 for directing the flow of blood through a patient through a single cannulation site, said catheter comprising

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

a first lumen extending between said first distal end and said proximal end;

a second lumen extending between said second distal end and said proximal end; and

a redirecting tip positioned at the distal end of one of the lumens and configured to redirect substantially all of the blood flow exiting said lumen in a direction generally opposite of the direction of flow;

wherein the redirecting tip further comprises a surface positioned at the distal end of and within one of the first and the second lumens, the surface configured to redirect substantially all of the blood flow exiting the lumen in a direction generally opposite of the direction of flow in the lumen; and

wherein the redirecting tip comprises a distal end having a generally hemispherical shape.

Appl. No. : 10/078,283
Filed : February 14, 2002

25. **(Currently Amended)** The multilumen catheter of Claim 619, wherein the redirecting tip comprises a distal end having a generally parabolic profile.

26. **(Currently Amended)** The multilumen catheter of Claim 619, further comprising a plurality of outlets in the side of the lumen wherein the surface is located.

27. **(Previously Presented)** The multilumen catheter of Claim 26, where at least three outlets are provided in a side of the lumen wherein the surface is located.

28. **(Previously Presented)** The multilumen catheter of Claim 26, wherein the outlets have a generally rectangular shape.

29. **(Previously Presented)** The multilumen catheter of Claim 26, wherein a member extends between the catheter body and the redirecting tip between two adjacent outlets.

30. **(Currently Amended)** The multilumen catheter of Claim 619, wherein the cross-sectional profile of the surface is substantially parabolic.

31. **(Currently Amended)** The multilumen catheter of Claim 619, further comprising a radiopaque marker.

32. – 45. **(Canceled)**

46. **(Currently Amended)** The multilumen catheter of Claim 6 wherein the redirecting tip further comprises a flow redirecting surface that curves radially outwardly from a proximal end to a distal end so as to define a generally parabolic curve rotated about a longitudinal axis of the lumen.

47. **(Previously Presented)** The multilumen catheter of Claim 6 further comprising at least one aperture in one of the lumens positioned in the lumen distal from the proximal end so that the aperture may reside within the patient's vasculature and close to the point of insertion when the multilumen catheter is inserted into the patient so that the aperture may maintain or enhance perfusion of blood to the patient's vasculature downstream of where the aperture resides in the vasculature when the catheter is inserted into the patient for treatment.

Appl. No. : **10/078,283**
Filed : **February 14, 2002**

48. (New) The multilumen catheter assembly of Claim 6, wherein the redirecting surface has a continuously curved profile that is symmetrical about a central axis of the first lumen and that extends from the central axis to the outlet.

49. (New) A multilumen catheter for directing the flow of blood through a patient through a single cannulation site, said catheter comprising:

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

a first lumen extending along a central axis between said first distal end and said proximal end adapted to fluidly communicate with the patient;

a second lumen extending between said second distal end and said proximal end adapted to fluidly communicate with the body independently of the first lumen; and

a redirecting tip positioned at the distal end of the first lumen, the redirecting tip comprising a discharge opening and a surface symmetrically disposed about the central axis of the first lumen and extending between the central axis and the discharge opening, the surface having a continuously curved profile and an apex off-set from the central axis of the first lumen, the redirecting tip being configured to redirect substantially all of the blood flow exiting said lumen in a direction generally opposite of the direction of flow in the lumen.

50. (New) A method of treating a patient, comprising:

inserting into a peripheral blood vessel of the patient a multilumen catheter having a first lumen having a first distal end, a second lumen having a second distal end, and a redirecting tip positioned at the first distal end;

advancing the multilumen catheter within the vasculature until the first lumen is in fluid communication with a first extracardiac vascular location and the second lumen is in fluid communication with a second extracardiac vascular location remote from the first extracardiac vascular location;

Appl. No. : 10/078,283
Filed : February 14, 2002

providing fluid communication between the first lumen and a pump and between the second lumen and the pump;

withdrawing an amount of blood from the second extracardiac vascular location through the second lumen;

delivering the amount of blood to the first extracardiac vascular location through the first lumen; and

redirecting substantially all of the blood exiting the first lumen in substantially the opposite direction of the flow in the first lumen.

51. (New) The method of Claim 50, wherein the multilumen catheter is advanced until the first distal end is distal of a branch blood vessel and the second distal end is proximal of the branch blood vessel.

52. (New) The method of Claim 50, wherein the multilumen catheter is advanced until the second lumen is in fluid communication with a femoral artery.

53. (New) The method of Claim 52, wherein the multilumen catheter is advanced until the first lumen is in fluid communication with the aorta.

54. (New) The method of Claim 50, wherein the multilumen catheter is advanced until the first lumen is in fluid communication with the aorta.